

Claim Amendments

1. (Currently amended) A structural member for use on a structural support, said member comprising:

a plurality of longitudinally extending girders;

a plurality of longitudinally extending composite beam and deck modules, each module comprising:

a plurality of longitudinal beams extending parallel to said girders, said beams being disposed to a side of said girders and below a top portion of said girders;

a plurality of shear connectors permanently attached to a top portion of said beams; and

a deck portion made of a moldable material disposed above ~~attached to~~ said beams, said deck portion being permanently attached to said beams when the moldable material is hardened around said shear connectors such that a shear connection is formed therebetween, wherein longitudinally extending separated sides of adjacent deck portions face one another and are positioned above a corresponding one of said girders; and

connecting means for connecting said adjacent deck portions to said girders and thereby forming a shear connection therebetween.

2. (New) The member of claim 1 further comprising an adhesive disposed between said sides of adjacent deck portions.

3. (New) The member of claim 2 wherein said adhesive is an epoxy adhesive.

4. (New) The member of claim 1 wherein one of said sides defines a longitudinally extending groove therein.

5. (New) The member of claim 4 wherein the other of said sides has a tongue portion thereon adapted for extending into said groove such that upper surfaces of said deck portions of said adjacent composite members are held substantially aligned.

6. (New) The member of claim 1 wherein said beams are characterized by tubes.

7. (New) The member of claim 1 further comprising leveling means for leveling upper surfaces of said deck portions.

8. (New) The member of claim 7 wherein said leveling means is characterized by a bolt engaged with said deck portion and adapted for engaging said girder whereby said deck portion may be raised above said girder such that a vertical gap is defined between a bottom portion of said deck portion and a top portion of said girder.

9. (New) The member of claim 8 wherein said bolt is threadingly engaged with an insert disposed in said deck portion.

10. (New) The member of claim 8 wherein said deck portion defines a grouting opening through which grout may be poured to fill said gap.

11. (New) The member of claim 10 wherein said a horizontal gap is defined between said girder and beams; and

further comprising:

a seal disposed in said horizontal gap for substantially sealing and closing said horizontal gap; and

grout poured in said vertical gap.

12. (New) The member of claim 1 wherein said connecting means comprises:
a plate disposed adjacent to said girder and one of said beams; and
fastening means for attaching said plate to said beam and said girder.
13. (New) The member of claim 12 wherein:
said plate is characterized by an angled member having a pair of legs; and
said fastening means comprises a fastener interconnecting one of said legs and said tube and another fastener interconnecting the other of said leg and a flange of said girder.
14. (New) The member of claim 12 wherein:
said plate is substantially flat; and
said fastening means is characterized by a fastener interconnecting said plate and said tube and another fastener interconnecting said plate and said girder.
15. (New) The member of claim 14 further comprising a spacer disposed between said plate and said flange of said girder.
16. (New) The member of claim 1 wherein said connecting means comprises:
a plurality of bolts extending through a flange of said girder into said deck portion.
17. (New) The member of claim 16 wherein said bolts are epoxy-drilled bolts.

18. (New) The member of claim 1 further comprising:
precompression means for clamping said sides of said adjacent deck portions together.

19. (New) The member of claim 18 wherein said precompression means comprises:
a plate attached to said girder;
a short tube disposed horizontally adjacent to one of said longitudinal tubes such that an end of said short tube abuts a wall of said longitudinal tube;
a plurality of short-tube shear connectors attached to a top portion of said short tube such that said short tube is attached to said deck portion when the moldable material is hardened around said short-tube shear connectors; and
a fastener adapted for tightening and interconnecting said plate and said short tube.

20. (New) The member of claim 19 wherein:
said plate is an angled member having a pair of legs; and
said fastener extends through one of said legs.

21. (New) The member of claim 20 wherein said short tube is substantially perpendicular to said longitudinal tube.

22. (New) The member of claim 21 further comprising a closure plate attached to said short tube.

23. (New) The member of claim 20 further comprising:
another angled member having a pair of legs, one of said legs on the other angled

member being attached to said short tube;

wherein, said fastener is attached to the other of said legs on the first-mentioned angled member and the other of said legs on the other angled member.

24. (New) The member of claim 23 wherein said short tube is disposed transversely with respect to said longitudinal tubes.

25. (New) The member of claim 18 wherein said precompression means comprises:
short tubes adjacent to longitudinal tubes on opposite sides of a corresponding girder and connected to said deck portion; and

a fastener disposed through said short tubes, said longitudinal tubes and a hole defined in said girder.

26. (New) The member of claim 25 wherein said short tube extends transversely with respect to said longitudinal tubes.

27. (New) The member of claim 25 further comprising a closure plate attached to an end of said short tube.

28. (New) The member of claim 1 wherein said girder is concrete and has upper and lower flanges molded therein.

29. (New) The member of claim 28 wherein said connecting means comprises:
a plate disposed adjacent to said girder and below a top portion of said girder and adjacent to and below a bottom portion of one of said beams; and
fastening means for attaching said plate to said beam and said girder.

30. (New) The member of claim 29 wherein:

said plate is characterized by an angled member having a pair of legs; and

said fastening means comprises a fastener adapted for tightening and interconnecting one of said legs and said tube and another fastener interconnecting the other of said legs and said upper flange of said girder.

31. (New) The member of claim 30 wherein said fastener is a bolt engaged with an insert disposed in said upper flange of said girder.

32. (New) The member of claim 31 wherein said insert is cast in said flange during manufacture of said girder.

33. (New) The member of claim 30 wherein said bolt is an epoxy-drilled bolt.

34. (New) The member of claim 28 further comprising:
precompression means for clamping said sides of said adjacent deck portions together.

35. (New) The member of claim 34 wherein said precompression means comprises:
a short tube disposed adjacent to one of said longitudinal tubes and connected to said deck portion;

a plate attached to said short tube; and

a fastener interconnecting said plate and said girder.

36. (New) The member of claim 31 wherein:
said plate is an angled member having a pair of legs, one of said legs being attached to said short tube; and

said fastener comprises an all-thread rod engaged with an upper flange of said

girder and a nut threadingly engaged with said all-thread rod and further engaged with the other leg of said angled member.

37. (New) The member of claim 36 wherein said all-thread rod is threadingly engaged with an insert disposed in said upper flange of said girder.

38. (New) The member of claim 37 wherein said insert is cast in said girder during manufacture thereof.

39. (New) The member of claim 35 wherein:
said plate is an angled member having a pair of legs, one of said legs being attached to said short tube; and

said fastener is an epoxy-drilled bolt extending through the other of said legs of said angled member and engaging said upper flange of said girder.

40. (New) The member of claim 1 further comprising:
transverse connecting means for connecting transversely extending sides of facing deck portions of adjacent modules to form a transverse joint therebetween.

41. (New) The member of claim 40 wherein said transverse connecting means comprises:

a plate disposed on one of adjacent beams of said adjacent modules; and
another plate disposed on the other of said adjacent beams of said adjacent modules; and

fastening means for interconnecting said plates.

42. (New) The member of claim 41 wherein:

said plates are angled members; and
said fastening means comprises a bolt disposed through facing legs of said angled members.

43. (New) The member of claim 40 further comprising an adhesive disposed between said transversely extending sides of said facing deck portions.

44. (New) The member of claim 43 wherein said adhesive is an epoxy adhesive.

45. (New) The member of claim 40 wherein one of said transversely extending sides defines a transversely extending groove therein.

46. (New) The member of claim 45 wherein:
the other of said transversely extending sides has a tongue portion thereon adapted for extending into said groove such that upper surfaces of said deck portions of said adjacent composite members are held substantially aligned.

47. (New) A structural member for use on a structural support, said member comprising:
a longitudinally extending girder;
a longitudinally extending composite beam and deck module, each module comprising:

a plurality of longitudinal beams extending parallel to one another and to said girder, said beams being disposed to a side of said girders and below a top portion of said girders;

a plurality of shear connectors permanently attached to a top portion of said beams; and

a deck portion made of a moldable material permanently attached to said beams when the moldable material is hardened around said shear connectors such that a shear connection is formed therebetween, wherein one of said beams is disposed on opposite sides of said girder; and

connecting means for connecting said deck portion to said girder and thereby forming a shear connection therebetween.

48. (New) The member of claim 47 wherein said connecting means comprises:

a plate disposed adjacent to one of said beams and said girder;

another plate disposed adjacent to the other of said beams and said girder; and

fastening means for connecting said plates to said girder and the corresponding longitudinal beams.

49. (New) The member of claim 48 wherein said plates are angled members having a pair of legs, one leg engaging the corresponding longitudinal tube and the other leg engaging a flange of said beam.

50. (New) The member of claim 47 further comprising leveling means for leveling an upper surface of said deck portion.

51. (New) The member of claim 50 wherein said leveling means comprises a bolt threadingly engaged in said deck portion and engaging an upper surface of said girder such that said deck portion may be raised above said girder such that a vertical gap is defined between a bottom portion of said deck portion and a top portion of said girder.

52. (New) The member of claim 51 wherein said deck portion defines a grouting opening through which grout may be poured to fill said vertical gap.

53. (New) The member of claim 52 wherein said horizontal gap is defined between said girder and beams; and

further comprising:

a seal disposed in said horizontal gap for substantially sealing and closing said horizontal gap; and
grout poured in said vertical gap.

54. (New) A method of repairing a bridge structure having a bridge deck supported by a plurality of longitudinally extending girders comprising the steps of:

(a) prefabricating a plurality of longitudinally extending beam and deck composite modules, each module comprising:

a plurality of substantially parallel longitudinal beams, said beams being disposed to a side of said girders and below a top portion of said girders;

a plurality of shear connectors permanently attached to a top portion of said beams; and

a deck portion made of a moldable material and attached to said beams when the moldable material is hardened around said shear connectors, such that a shear connection is formed therebetween;

(b) removing an old section of said bridge deck from an area above one of the girders while leaving the girder in place;

(c) positioning at least one of said modules in said area to replace said old section such that said beams extend longitudinally and substantially parallel to said girder; and

(d) clamping facing longitudinal sides of adjacent deck portions of adjacent modules together such that a longitudinally continuous and precompressed, sealed joint is formed between said adjacent deck portions.

55. (New) The method of claim 54 wherein step (a) comprises prefabricating said modules in an inverted position.

56. (New) The method of claim 54 further comprising:
prior to step (d), placing an adhesive between said facing longitudinal sides of said adjacent deck portions.

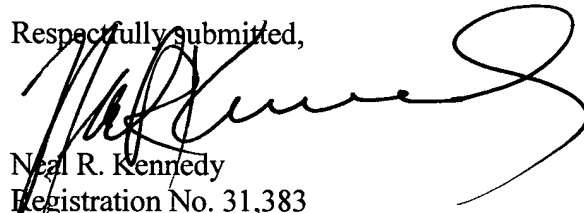
57. (New) The method of claim 54 wherein step (a) comprises:
forming one of said deck portions with a longitudinally extending groove defined in a side thereof and another deck portion with a tongue thereon adapted for extending into the groove after step (d) such that upper surfaces of said adjacent deck portions are held substantially aligned.

58. (New) The method of claim 57 further comprising:
prior to step (d), placing an adhesive in said groove.

59. (New) The method of claim 54 wherein:
step (a) comprises fabricating said deck portions with a plurality of leveling bolts disposed therein such that said leveling bolts are adapted for engaging an upper surface of said girder when said deck portions are placed in said area; and
further comprising, prior to step (b), using said bolts to level upper surfaces of said deck portions such that all of said deck portions are substantially aligned.

60. (New) The method of claim 59 wherein:
- step (a) comprises casting threaded inserts in said deck portions, said threaded inserts being engaged by said leveling bolts.
61. (New) The method of claim 59 wherein:
- said step of leveling causes a vertical gap defined between a bottom portion of said adjacent deck portions and a top portion of the corresponding girder; and
- step (a) comprises fabricating said deck portions with a plurality of grouting openings therein through which grout may be poured to fill said vertical gap;
- and further comprising:
- (e) filling said vertical gap with a high-strength grout through said grouting openings.
62. (New) The method of claim 61 further comprising:
- prior to step (e), sealing and closing a horizontal gap between said girder and said beams adjacent thereto.
63. (New) The method of claim 54 further comprising:
- (e) attaching adjacent longitudinal beams of adjacent modules along a transverse joint therebetween.
64. (New) The method of claim 54 further comprising:
- (f) connecting said beams to said girder such that a shear connection is formed therebetween.

Respectfully submitted,



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